THE HABITATS OF THE MADEIRAN GRAYLING *HIPPARCHIA ARISTEUS MADERENSIS* (LEP.: NYMPHALIDAE: SATYRINAE)

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HIGGINS & RILEY (1970, 1973) describe the Madeiran grayling *Hipparchia aristeus maderensis* as a very local butterfly which flies in July/August on grassy and stony slopes from 100m upwards. Kudrna (1977) places it as *H. algirica maderensis* and also describes it as local and rare, but describes its habitats as rocky clearings in sparse deciduous woodland between 1000 and 1700m. Kudrna further states that its flight period is from the end of June to early September. Neither author gives hostplants and in view of the differences of their accounts we think a very brief description of our observations of this species warrants recording.

We visited Madeira between 7th and 21st September 1989 and travelled extensively over most of the island and its habitats. *H. aristeus maderensis* was observed at several sites (Table 1) and appeared widespread, though numbers seen varied between sites. At all sites individuals were worn and our observations probably coincide with the end of the flight period. From our observations it appears that the butterfly is most commonly associated with areas of light (conifer) woodland with extensive grass and herb layers which also contain both bare earth and abundant nectar sources (especially *Origanum* and *Rubus* species). Such habitats generally occur at mid-altitudes (800 - 1200m.) on the island particularly in the south and south-western parts. In view of the habitat associations of the butterfly and the distribution of these habitats over the island, combined with the ease with which we came across specimens, we suggest that the butterfly is probably both widespread and common. No individuals were observed on the most extensive area of high altitude (c. 1500m.) flat stony grassland, Paul de Serra, towards the centre of the island. Neither were there any individuals on Ponta de Sao Lourenco, an extensive area of low elevation (<100m.) dry broken grassland at the eastern tip of the island. We suspect that the butterfly is absent from Paul de Serra because the area is very exposed and subject to heavy grazing pressure, which, in combination with low air temperatures, the dry nature of the site and the lack of trees and shrubs apart from isolated gorse bushes make the habitat unsuitable for the butterfly. It was, however, found flying in some abundance on the southern and south-western slopes below this area, excluding those locations where there was very dense regenerating tree heath (*Erica arboracea*). Ponta del Sol is also unsuitable habitat because of extreme drought in the summer, at the time of our visit there was little live vegetation and the site was remarkable for the absence of flying insects.

Of note is the observation that the Madeiran grayling can occur at very high density. For example, in lightly-grazed pine woods south of Poiso the density of the butterfly appeared to be greater than that of any other

Table 1. Locations, habitats and an estimate of relative sizes of populations of *Hipparchia aristeus maderensis* on the island of Madeira, recorded between 7th and 21st September 1989.

Location	Habitat	Altitude (m)	Numbers observed
Route ER103, 5 km stretch of road, south of Poiso	Open pine woodland, with grassland ground cover	1150-1400	>>100
Route ER103, 2 km south of Ribo Frio	Pine woodland with dense laurel regrowth, bramble and small grassland areas	850	>30
Route ER104, Boca do Encumeada	Small area of grassland in dense laurel forest	1000	1
Route ER208, south approach to Paul de Serra	Grass slopes in open laurel and heath woodland interspersed with eucalyptus	1100	>20
Route ER208, north of Achada do Poiso	Open pine and eucalyptus woodland with grassland ground cover	600	<5
Route ER204, Fonta da Pedra	Grazed laurel forest with closely cropped grassland below trees	1000	<5
Junction of ER204 and ER101, Centro de Reproducao Animal	Grazed grassland and laurel and eucalyptus woodland interspersed with grassland and waste	650	<5
Route ER102, 1 km south of Aguas Mansas	Open pine and eucalyptus woodland with grassland ground cover	700	<5
Route ER103, junction with route to Sao Roque do Faial	Laurel, eucalyptus and pine woodland, apple orchards with patches of dry grassland	550	>5
Route EN101, from Achadas da Cruz to Ponta do Pargo (15 km length)	Open pine, eucalyptus and laurel woodland with limited agriculture; grassland under trees	450-900	Isolated individuals all along route.

Most observations of numbers refer to the number seen within a period of approximately five minutes.

populations of grayling observed by us in western Europe, save those of *Arethusena arethusa* in relict Mediterranean forest in southern France (Shreeve, pers. obs.). We suspect that local weather patterns on the island of Madeira may be responsible for such aggregations for two reasons. Firstly, the wooded grassy slopes where the butterfly was most abundant are subject to strong updraughts and fog from mid-day onwards, and the location in which we located the densest population was at the head of a steep south facing valley which was somewhat sheltered from the main updraughts. Aggregations may be caused by butterflies being carried on updraughts to particular sheltered locations. Secondly, our observations at Poiso suggest to us that this site tended to be less cloudy than those on immediately adjacent slopes. Although the butterfly can fly in fairly cool and dull conditions, adults being observed flying in dense fog, prolonged sunshine at selected sites may extend the time available for feeding, mate-location and egg-laying, hence leading to the formation of dense assemblies of individuals in those sites where time constraints on activity are minimised.

Six females were observed egg-laying at Poiso, and the placement of nine eggs noted. Of these, six were placed low (<10mm.) on green shoots of a *Holcus* grass species, the remainder on dry stems, and exposed roots of an *Agrostis* species (our identifications). The behaviour of egg-laying females was similar to that described for *H. semele* (see Shreeve, 1990). At Poiso these two grasses represent the most widespread and common of those present and they may represent the principal larval foodplants there. Other larval hostplants may be used since members of the genus *Hipparchia* are known to use a variety of grasses as hostplants (*Emmet & Heath,* 1989).

We are aware of the systematic minefield involving the genus *Hipparchia* and the *semele/arethusena* species, the status of the Madeiran and Azores graylings and their relationships to each other and to mainland forms (see Higgins & Riley, 1973; Higgins, 1975; Kudrna, 1977). We are further aware of the dangers of over-extrapolation from limited data. All systematic studies of these species have relied on adult size, pattern variation and genital structure. However, we consider size and pattern to be too variable in *Hipparchia* species to be reliable taxonomic characters. The underside colour and pattern of the Madeiran grayling is more variable than admitted by Kudrna (1977) (Shreeve & Smith, in prep.), and Higgins (1976) and Kudrna (1977) differ in their descriptions of its genitalia. Higgins & Riley (1970, 1973) class the Madeiran grayling as a subspecies of *H. ariseus* and separate the Azores grayling as a distinct species. Subsequently, Higgins (1975) downgrades the Azores grayling to a subspecies of *H. aristeus*. Kudrna (1977) retains specific rank for the Azores grayling and considers the Madeiran grayling as a subspecies of *H. algirica*. Implicit to these systems are differences of emphasis in phylogenetic origin and differentiation.

Of interest to us are the origins of the Atlantic island graylings, their relationship to each other and to the mainland species complex. The main species to which the island forms are most closely related are characteristic of Mediterranean regions in which the occupied habitats are subject to a summer drought. On Madeira there is also a summer dry season, though this may be less severe than in parts of mainland Europe, the Mediterranean islands and north Africa. With one exception (*H. aristeus senthes, sensu* Higgins & Riley), the mainland species in the Mediterranean zone have flight periods at the beginning or mid-way through the summer drought (May - August). From our observations the Madeiran grayling flies towards the end of this dry period (August - September), though Kudrna (1977) gives an earlier start to the flight period (June). The Madeiran grayling is also associated with a woodland element within grassland, this last being described as the usual habitat of all other members of this group. Woodland is the endemic dominant vegetation type on Madeira and, with the exception of Ponta de Sao Lourenco, extensive grassland areas form a relatively new habitat. It seems feasible that this distinct butterfly may have developed associations with the ancient (wooded) rather than the modern

habitat types and may also have developed a distinct flight period with associated life-history adjustments. That no association has developed with the only ancient grassland area, at Ponta de Sao Lourenco, is not surprising, given the very dry nature of the site in the summer months. We therefore suggest that more careful examination of flight periods and hostplant-habitat associations may reveal much about the evolutionary origins and systematics of the graylings of the Atlantic islands and elsewhere.

References

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New Microlepidoptera records from Nottinghamshire (v.c. 56)

The following constitute new county records for Nottinghamshire:

Stigmella centifoliella Zell. Occupied mine in *Rosa* sp., Colwick, collected 5.11.89, emerged 22.2.90 (forced).

Narycia monilifera Geoff. Two occupied larval cases found on Oak trunk, Colwick Wood 27.4.90, and one imago caught at the same site 1.6.90. Also found more commonly at Carlton when one imago and seven occupied larval cases were taken on trunks of *Tilia* and *Castanea* 18.6.90.

Luffia ferchaultella Stephs. Seven old larval cases found on trunks and boughs of apple trees, Colwick C.P. in mid-February.

Phyllonorycter dubitella H.-S. Occupied mines in *Salix caprea,* Colwick (old goods yards) collected 28.6.90, emerged 8.7.90 onwards.

Yponomeuta malinellus Zell. One gravid female taken on leaf of apple tree in friend's garden, Carlton, 13.7.90, the tree showing very heavy infestation by the earlier larvae.

Mompha nodicolella Fuchs. Presence first detected on 8.6.90, when old dead stems of *Epilobium angustifolium* were noticed showing conspicuous galls at a wasteground at this site and several collected on 24.6.90. The first emerged on10.7.90 and subsequently. The larval workings were also detected a couple of miles away at Colwick (old goods yards) but were very noticeably less common at this site.

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